

CLAIMS:

- 1.(currently amended) A rotary cutting apparatus comprising:
 - a body;
 - a motor mounted on said body;
 - a rotary shaft assembly having an axis and adapted to hold a cutting tool coaxial with said axis; and,
 - a feed mechanism for moving said cutting tool ~~held by said rotary shaft assembly along said axis~~ between an extended position and a retracted position;
 - wherein said rotary shaft assembly comprisingcomprises:
 - a proximal rotary shaft ~~that is concentric with said axis~~ and mounted coaxially with said axis on said body for rotation about said axis, said proximal rotary shaft being drivingly connected to said motor;
 - an intermediate rotary shaft that is concentric with said axis and telescopically connected coaxially and telescopically to said proximal rotary shaft to move relative to said proximal rotary shaft along said axis between an extended position and a retracted position for axial movement between them but for no relative rotation therebetween, whereby said intermediate rotary shaft being rotatable rotates together with said proximal rotary shaft;
 - a distal rotary shaft concentric with said axis and telescopically that is connected coaxially and telescopically to said intermediate rotary shaft to move relative to said intermediate rotary shaft along said axis between an extended position and a retracted position for axial movement between them but no relative rotation therebetween, whereby said distal rotary shaft being rotatable rotates together with said intermediate rotary shaft ; and,
 - a cylindrical housing concentric with said axis, said cylindrical housing that rotatably holdinghouses said distal rotary shaft and being movable along said axis together with said distal rotary shaft for no relative axial movement between said cylindrical house and said distal rotary shaft such that said cylindrical housing moves axially together with said distal rotary shaft; and

~~said feed mechanism having a drive member engaged with said cylindrical housing and movable in parallel with said axis to bring said rotary shaft assembly to an extended position wherein said intermediate and distal rotary shafts are in said extended positions thereof and to a retracted position wherein said intermediate and distal rotary shafts are in said retracted positions thereof~~

further wherein said feed mechanism comprises:

a first rack that is fixedly mounted on said cylindrical housing and has a column of teeth arranged along said axis;

a second rack that is fixedly mounted on said body and has a column of teeth arranged along said axis opposite to the teeth of said first rack; and

a pinion that is positioned in engagement with the teeth of both said first and second racks, said pinion being axially movable relative to each of said first and second racks, whereby rotation of said pinion causes relative axial movement between said body and said pinion and further relative axial movement between the pinion and said cylindrical housing.

2.(cancelled)

3.(currently amended) A rotary cutting apparatus as set forth in claim 2claim 1, wherein

 said motor has an output shaft extending normal to the axis of said rotary shaft assembly.

4.(original) A rotary cutting apparatus as set forth in claim 3, wherein
 said rotary cutting apparatus comprises a magnetic base having an electrical magnet; and,

 said body is mounted on said magnetic base such that said rotary shaft assembly is movable on a plane normal to said axis of said rotary shaft assembly.

5.(original) A rotary cutting apparatus as set forth in claim 4, wherein
 said magnetic base has a pivot member having an axis parallel to said axis of said rotary shaft assembly;

said body is rotatable about said pivot member; and,
 said rotary cutting apparatus further comprises a fastener for fixing said body at a desired angular position about said pivot member.

6.(currently amended) A rotary cutting apparatus as set forth in claim 5 wherein,

 said fastening member has a pair of leg portions and an intermediate portion positioned between said leg portions and surrounding said pivot member, said leg portions each having inner and outer surfaces, said inner surfaces of said leg portions being spaced away from and facing each other;

 said body has a guide member having side portions between which said leg portions are positioned and which slidably engage said outer surfaces of said leg portions so that said body with the guide member is movable on said plane along said leg portions; and,

 said fastening member further has a fastening ~~bold~~bolt laterally extending through and threadably engaged with one of said side portions of said guide member, said fastening bolt having an inner or tip end engaged with one of said outer surfaces of said leg portions in such a manner that, when the fastening bolt is rotated about its axis to advance inwardly, the tip end of said fastening bolt urges one of said leg portions, which has said one of said outer surfaces, towards the other leg portion and finally presses both of the leg portions against the other side portion of said guide member, whereby the intermediate portion of said fastening member is tightened to be firmly engaged with said pivot member and, thus, the body is fixedly secured to said magnetic base.

7.(currently amended) A rotary cutting apparatus comprising:
 a body;
 a motor mounted on said body;
 a rotary shaft assembly having an axis and adapted to hold a cutting tool coaxial with said axis; and,

a feed mechanism for moving said cutting tool ~~held by said rotary shaft assembly~~ along said axis between an extended position and a retracted position;

wherein said rotary shaft assembly comprisingcomprises:

~~a proximal rotary shaft coaxial with said axis, said proximal rotary shaft being~~ that is mounted coaxially with said axis on said body for rotation about said axis and drivingly connected to said motor;

~~a distal rotary shaft that is coaxial with said axis, said distal rotary shaft being rotated about said axis by said proximal rotary shaft and axially movable relative to said proximal shaft along said axis between an extended position wherein said distal rotary shaft has been moved in a direction away from said proximal rotary shaft and a retracted position wherein said distal rotary shaft has been moved towards said proximal rotary shaft from said extended position;~~ and

~~a cylindrical housing coaxial with said axis, said cylindrical housing that rotatably holdinghouses said distal rotary shaft and movable along said axis together with said distal rotary shaft for no relative axial movement between said cylindrical housing and said distal rotary shaft such that said cylindrical housing moves axially together with said distal rotary shaft;~~ and

further wherein said feed mechanism comprisingcomprises:

~~a first rack that is fixedly mounted on said cylindrical housing and having has a column of teeth extending in parallel witharranged along said axis of said rotary shaft assembly and facing radially outwardly relative to said axis;~~

~~a second rack that is securely fixedly mounted on said body and having has a column of teeth extending in parallel witharranged along the axis opposite to said column of teeth of said first rack with a space interposed therebetween;~~ and,

~~a pinion that is positioned between and engaged with said columns of in engagement with the teeth of both said first and second racks, said pinion being axially movable relative to each of said first and second racks, whereby rotation of said pinion causes relative axial movement between said body and said pinion and further relative axial movement between the pinion and said cylindrical housing.~~

8.(original) A rotary cutting apparatus as set forth in claim 7, wherein

said rotary cutting apparatus comprises a magnetic base having an electrical magnet; and,

 said body is mounted on said magnetic base such that said rotary shaft assembly is movable on a plane normal to said axis of said rotary shaft assembly.

9.(original) A rotary cutting apparatus as set forth in claim 8, wherein

 said magnetic base has a pivot member having an axis parallel to said axis of said rotary shaft assembly;

 said body is rotatable about said pivot member and has a fastening member for fixing said body at a desired angular position about said pivot member.

10.(currently amended) A rotary cutting apparatus as set forth in claim 9 wherein,

 said fastening member has a pair of leg portions and an intermediate portion positioned between said leg portions and surrounding said pivot member, said leg portions each having inner and outer surfaces, said inner surfaces of said leg portions being spaced away from and facing each other;

 said body has a guide member having side portions between which said leg portions are positioned and which slidably engage said outer surfaces of said leg portions so that said body with the guide member is movable on said plane along said leg portions; and,

 said fastening member further has a fastening bold-bolt laterally extending through and threadably engaged with one of said side portions of said guide member, said fastening bolt having an inner or tip end engaged with one of said outer surfaces of said leg portions in such a manner that, when the fastening bolt is rotated about its axis to advance inwardly, the tip end of said fastening bolt urges one of said leg portions, which has said one of said outer surfaces, towards the other leg portion and finally presses both of the leg portions against the other side portion of said guide member, whereby the intermediate portion of said fastening member is tightened to be firmly engaged with said pivot member and, thus, the body is fixedly secured to said magnetic base.

11.(currently amended) A rotary cutting apparatus comprising:

a body;

a motor mounted on said body;

a rotary shaft assembly having an axis of rotation and a distal end adapted to hold a cutting tool coaxial with said axis, said rotary shaft assembly being mounted on said body such that said rotary shaft assembly is movable along said axis; and,

a feed mechanism for moving said cutting tool ~~held by said rotary shaft assembly~~ along said axis between an extended position and a retracted position;

wherein said rotary shaft assembly comprisingcomprises:

a proximal rotary shaft that is coaxial with said axis, said proximal rotary shaft being drivingly connected to said motor to be rotated about said axis and movable along said axis ~~between a first position and a second position, said first position being closer to said distal end of said rotary shaft assembly than said second position~~;

a distal rotary shaft that is coaxial with said proximal rotary shaft and adapted to hold said cutting tool, said distal rotary shaft being rotated about said axis by said proximal rotary shaft and axially movable relative to said proximal rotary shaft along said axis ~~between an extended position wherein said distal rotary shaft has been moved in a direction away from said proximal rotary shaft and a retracted position wherein said distal rotary shaft has been moved towards said proximal rotary shaft from said extended position~~; and

a cylindrical housing that rotatably holdinghouses said distal rotary shaft and movable along said axis together with said distal rotary shaft~~for no relative axial movement between said cylindrical housing and said distal rotary shaft such that said cylindrical housing moves axially together with said distal rotary shaft~~; and

further wherein said feed mechanism comprisingcomprises:

a first rack that is fixedly mounted on said cylindrical housing and having has a column of teeth extending in parallel with and facing radially outwardly relative toarranged along said axis;

a second rack that is securely fixedly mounted on said body and having
has a column of teeth extending in parallel with said column ofarranged along said axis
opposite to the teeth of said first rackwith a space interposed therebetween; and,

a pinion that is positioned between said columns ofin engagement with
the teeth of both said first and second racks and engaged with said teeth of said
columns, said pinion being axially movable relative to each of said first and second
racks, whereby rotation of said pinion causes relative axial movement between said
body and said pinion and further relative axial movement between the pinion and said
cylindrical housing;

wherein rotation of said pinion causes axial movement of said rotary shaft
assembly is moved by said feed mechanism in its entirety between asaid retracted
position wherein said proximal rotary shaft is in said second position and said distal
rotary shaft is in said retracted position and ansaid extended position wherein said
proximal rotary shaft is in said first position and said distal rotary shaft is in said
extended position.

12.(currently amended) A rotary cutting apparatus as set forth in claim 11,
wherein

said rotary cutting apparatus comprises a gear train positioned between
said motor and said distal rotary shaft; and,

said gear train comprises;

a first spur gear coaxial with and secured connected to said proximal
rotary shaft; and,

a second spur gear engaged with said first spur gear;

wherein said second spur gear havinghasan axial length to enableso that
said first spur gear to keep the engagementwill stay engagedwith said first flatsecond
spur gear when said proximal rotary shaft is moved axially, together with the first spur
gear secured thereto between said first and second positions.

13.(original) A rotary cutting apparatus as set forth in claim 11, wherein

said rotary cutting apparatus comprises a magnetic base having an electrical magnet;

 said motor has an output shaft extending normal to said proximal rotary shaft; and,

 said body is mounted on said magnetic base such that said rotary shaft assembly is movable on a plane normal to said axis of said rotary shaft assembly.

14.(original) A rotary cutting apparatus as set forth in claim 13, wherein

 said magnetic base has a pivot member having an axis parallel to said axis of said rotary shaft assembly;

 said body is rotatable about said pivot member; and,

 said rotary cutting apparatus further comprises a fastening member for fixing said body at a desired angular position about said pivot member.

15.(currently amended) A rotary cutting apparatus as set forth in claim 14 wherein,

 said fastening member has a pair of leg portions and an intermediate portion positioned between said leg portions and surrounding said pivot member, said leg portions each having inner and outer surfaces, said inner surfaces of said leg portions being spaced away from and facing each other;

 said body has a guide member having side portions between which said leg portions are positioned and which slidably engage said outer surfaces of said leg portions so that said body with the guide member is movable on said plane along said leg portions; and,

 said fastening member further has a fastening ~~bold~~bold-bolt laterally extending through and threadably engaged with one of said side portions of said guide member, said fastening bolt having an inner or tip end engaged with one of said outer surfaces of said leg portions in such a manner that, when the fastening bolt is rotated about its axis to advance inwardly, the tip end of said fastening bolt urges one of said leg portions, which has said one of said outer surfaces, towards the other leg portion and finally presses both of the leg portions against the other side portion of said guide member,

whereby the intermediate portion of said fastening member is tightened to be firmly engaged with said pivot member and, thus, the body is fixedly secured to said magnetic base.

16.(currently amended) A rotary cutting apparatus comprising:

a base for fastening said rotary cutting apparatus at a desired position; and,

a body that is mounted on said base such that said body is movable along an axis relative to said base,

wherein said body comprisingcomprises:

a motor that is mounted on said body;

a rotary shaft assembly that rotates around said having an axis of rotation and is adapted to hold a cutting tool coaxial with said axis; and,

a feed mechanism for moving said cutting tool held by said rotary shaft assembly along said axis between an extended position and a retracted position;

wherein said rotary shaft assembly comprisingcomprises:

a proximal rotary shaft that is coaxial with said axis, said proximal rotary shaft being drivingly connected to said motor to be rotated about said axis;

a distal rotary shaft that is coaxial with said proximal rotary shaft and adapted to hold said cutting tool, said distal rotary shaft being rotated about said axis by said proximal rotary shaft and axially movable relative to said proximal rotary shaft along said axis between an extended position wherein said distal rotary shaft has been moved in a direction away from said proximal rotary shaft and a retracted position wherein said distal rotary shaft has been moved towards said proximal rotary shaft from said extended position; and

a cylindrical housing that rotatably holding houses said distal rotary shaft and for no relative axial movement between the cylindrical housing and said distal rotary shaft such that said cylindrical housing moves axiallymovable along said axis together with said distal rotary shaft; and

said body being movable in parallel with said axis;

further wherein said feed mechanism comprisingcomprises:

a first rack that is fixedly mounted on said cylindrical housing and having
has a column of teeth extending in parallel with arranged along said axis of said rotary
shaft assembly and facing radially outwardly relative to said axis of said rotary shaft
assembly;

a second rack that securely is fixedly mounted on said base and having
has a column of teeth extending in parallel with arranged along said axis opposite to the
column of teeth of said first rack with a space interposed therebetween; and,

a pinion that is positioned between and engaged in engagement with the
teeth of both said columns of teeth of said first and second racks, said pinion being
axially movable relative to each of said first and second racks, whereby rotation of said
pinion causes relative axial movement between said base and said pinion and further
relative axial movement between the pinion and said cylindrical housing.

17.(original) A rotary cutting apparatus as set forth in claim 16, wherein
said rotary cutting apparatus comprises a magnetic base having an
electrical magnet;

said motor having an output shaft extending normal to said rotary shaft
assembly; and,

said body is mounted on said magnetic base such that said rotary shaft
assembly is movable on a plane normal to said axis of said rotary shaft assembly.

18.(original) A rotary cutting apparatus as set forth in claim 17, wherein
said magnetic base has a pivot member having an axis parallel to said
axis of said rotary shaft assembly;

said body is rotatable about said pivot member and has a fastening
member for fixing said body at a desired angular position about said pivot member.

19.(currently amended) A rotary cutting apparatus as set forth in claim 18
wherein,

said fastening member has a pair of leg portions and an intermediate
portion positioned between said leg portions and surrounding said pivot member, said

leg portions each having inner and outer surfaces, said inner surfaces of said leg portions being spaced away from and facing each other;

 said body has a guide member having side portions between which said leg portions are positioned and which slidably engage said outer surfaces of said leg portions so that said body with the guide member is movable on said plane along said leg portions; and,

 said fastening member further has a fastening ~~bold~~bold bolt laterally extending through and threadably engaged with one of said side portions of said guide member, said fastening bolt having an inner or tip end engaged with one of said outer surfaces of said leg portions in such a manner that, when the fastening bolt is rotated about its axis to advance inwardly, the tip end of said fastening bolt urges one of said leg portions, which has said one of said outer surfaces, towards the other leg portion and finally presses both of the leg portions against the other side portion of said guide member, whereby the intermediate portion of said fastening member is tightened to be firmly engaged with said pivot member and, thus, the body is fixedly secured to said magnetic base.